TRW SPACE TECHNOLOGY LABORATORIES
THOMPSON RAMO WOOLDRIDGE INC.
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20 December 1965

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National Aeronautics and Space Administration
Goddard Space Flight Center
Glen Dale Road
Greenbelt, Maryland

Attention: Mr. M. Schach
Code 633

Subject: Monthly Progress Report
Period Ending 1 December
Contract NAS5-3805
Report No. 4161-6018-R0000

I. Progress in This Report Period

The irradiation chamber for the conduct of pulsed photoconductivity in vacuum has been completed. Initial experiments with 10 ohm-cm p-type silicon indicate that adequate signals for lifetime measurements can be attained with this technique. One difficulty is RFI noise from the electron beam deflection pulse being picked up by the test specimen. Though this noise signal does not interfere with room temperature measurements of unirradiated silicon, it will have to be reduced for measurements of shorter lifetimes at either lower temperatures or on irradiated specimens. Efforts to eliminate this noise pickup are now underway and it is anticipated that the noise signal can be reduced to a few millivolts with special shielding apparatus now under construction. The technique of pulsed photoconductivity using the pulsed electron beam has been demonstrated as an adequate approach to lifetime studies in spite of the signal-to-noise ratio problems that were anticipated.

The study of the Ev + 0.3ev level in p-type silicon has been extended to other dopants. Additional work was also done to confirm the preliminary work reported last month. It is now felt that doping has no influence on the introduction rate of the 0.3ev level. The studies made have included crucible grown p-type silicon doped with B, Al, In, Ga, and Gd. In all cases the room temperature introduction rate of the Ev + 0.3ev level for 1 Mev electrons is 0.028 cm^{-1}. The only factor found which influences the introduction

of this level is the oxygen concentration. Since the 0.3ev level is not found in floating zone silicon, this can be considered additional evidence that the 0.3ev level and the Si-K center are associated with the same defect.

Annealing studies of the 0.3ev level have also been continued. Efforts to understand the annealing of this energy level have been complicated because the sample does not anneal to the pre-irradiated condition at temperatures below 600°C. It now appears that the 0.3 level anneals into several other deep defect levels. This change begins at 400°C. At temperatures below this the 0.3 level is stable; however, annealing produces shallower levels at about 0.2ev. The concentration of these levels is very small compared to that of 0.3ev levels. Because of the overlapping effects of these levels, the Hall coefficient may not be the best method for annealing studies of the 0.3ev level. Other methods are under consideration.

II. Anticipated Activities During the Next Report Period

One Mev electron irradiation and Hall effects measurements of silicon as a function of dopant materials will be continued. In addition, final refinements on the pulsed photoconductivity apparatus will be completed and lifetime measurements as a function of temperature and irradiation will be initiated.

III. Manpower Expended in This Report Period

MANPOWER EXPENDITURES
NAS5-3805

Period 1 November - 28 November

	TOTAL
J. R. Carter	120
R. G. Downing	28
H. Flicker	152
Total	300

Respectfully submitted,

R. G. Downing
Project Manager

Approved:

J. M. Denney, Director
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RGD:caa